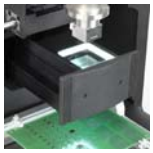
OK INTERNATIONAL™

Precision Systems for the Electronics Bench



APR-5000
User's Manual

- Specifications
- Introduction & General Overview
- System Features and Accessories
- Set-up
- Software Operation
- Calibration
- Nozzles and Vacuum Tubes
- Spare Parts and Accessories
- Site Preparation
- Warranty & Service

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PREFACE

SAFETY AND REGULATORY INFORMATION

WARNING

- TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE SYSTEM TO MOISTURE.

- TO PREVENT FIRE OR SHOCK HAZARD, DO NOT USE FLAMMABLE SOLVENTS NEAR OR ON THE SYSTEM WHILE CONNECTED TO POWER SOURCE.

- TO PREVENT POSSIBILITY OF INJURY OR DAMAGE TO THE SYSTEM, DO NOT OPERATE WITH ANY COVERS OR PANELS REMOVED.

- CHANGES OR MODIFICATIONS MADE TO THIS PRODUCT WITHOUT EXPRESS APPROVAL FROM METCAL COULD VOID THE USERS AUTHORITY TO OPERATE THE EQUIPMENT.

- Read and understand the entire Operator's Manual before installation or operation of the APR-5000. Heed all warnings on the system and in the operating instructions.

- Use of the APR-5000 is intended only for the removal and placement of electronic components on to printed circuit boards by properly trained personnel. If you are not familiar with the proper and safe operation of the APR-5000, do not operate until proper training has been obtained.

- The unit should be operated only from the type of power source indicated on the serial number label.

- Use only the supplied power cords. Avoid damage to the power cord. If damage should occur, replace it with the approved Metcal replacement power cord.

This CAUTION symbol on the equipment refers the user to the Operator's Manual for additional information. This symbol appears next to the relevant information in the manual.

This HOT symbol on the equipment warns the user of a hot surface and potential injury if touched. Please refer to the Operator's Manual for additional information. This symbol appears next to the relevant information in the manual.

This HEAVY LIFTING symbol on the packaging warns the user to team lift the APR-5000 during removal from packaging and installation on the workbench. Please refer to the Operator's Manual for additional information. This symbol appears next to the relevant information in the manual.

Other Safety Tips

- Unplug the unit before cleaning. Clean the exterior of the system with a damp cloth. Do not use solvent-based cleaners.

- Slots and openings in the system provided for ventilation and to ensure reliable operation and protection from overheating. The openings should never be blocked or covered.

- Do not overload power outlets and extension cords. This can result in a risk of fire or electric shock.

SAFETY AND EMC INFORMATION

Declaration of Conformity

We declare our sole responsibility that the product APR-5000 to which this declaration relates, is in conformity with the following standards and bears therefore a CE mark:

- EN 61010-1
- EN 61010-2-010

Safety Standards

The APR-5000 is in conformity with international safety requirements and bears the following safety marks:

- ETLu
- ETLc

EMC Standards

Europe

- EN 61000-3-2/3
- EN 61326-1

North America

- 47 CFR part 15 (FCC Class A), meets Class A limits

Federal Communications Commission

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in an industrial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the system off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

Minimum Computer Operation Specification

APR-5000	**Rework System**
Base Unit Input Voltage	115VAC/230VAC, 50/60Hz
Base Unit Power Consumption	2000 watts
Circuit Breaker Subzone Heaters	15 amp
Circuit Breaker Main Unit	15 amp
Max Source Temperature Bottom-side heater:	350°C (662°F)
Max Source Temperature from Micro Oven	400°C (752°F)

Basic Specifications of the APR-5000

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Max Source Temperature Bottom-side heater:	350°C (662°F)
Max Source Temperature from Micro Oven	400°C (752°F)
Temperature Control/Range	Closed-loop RTD
Maximum PCB Dimensions	250 X 230mm (10” X 9”)
PCB Thickness	0.5 – 2.0mm
Component Maximum Weight	55 gm (.92 oz)
Component Types	BGA, CSP, LGA, Micro SMD, MLF Bumped Chip
Airflow	8-24 l/min L=8lpm, M=16lpm, H=24lpm
Heater Element	350 W top / 1.5kW bottom
Vacuum Pump	15" Hg 381mm Hg
Base Unit Dimensions	50 X 76 X 71 cm (w X d X h)
Base Unit Weight	64 Kg (140Lbs)
Warranty	One year parts & labor 90 days heaters & lamps

System Part Numbers

Part Number	**Item Description**
APR-5000	115/230 VAC Array Package Rework System
APR-5000-COMP	Array Package Rework System with Computer
APR-5000-COMP-F	Array Package Rework System with Computer and Flat Screen Monitor

Environmental Conditions (all models)

- Suitable for indoor use only at altitudes not exceeding 6500 ft (2km)
- All systems must be grounded
- Maximum relative humidity of 80% at 88°F (31°C) decreasing linearly to 50% at 104°F (40°C)
- Temperature range of 41°F (5°C) to 104°F (40°C)
- Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage
- Pollution degree 2 per IEC 644
- Insulation category II

Vision System
The APR-5000 systems provide a maximum four-sided view of 46mm x 46mm (1.77" x 1.77). The camera magnification has a range of 10X to 27X.

Shipping Data

Size	28" W x 36"D x 32" H
Weight	180 lbs. (82 KG.)

I. INTRODUCTION AND GENERAL OVERVIEW

Thank you for your purchase of an APR-5000 Array Package Rework System. Each unit has been inspected thoroughly by OK International prior to shipment, and with proper maintenance will give you years of reliable performance.

This Operator's Instruction Manual is a valuable resource. It explains the systems options, features, specifications and the correct operation of your APR-5000 Array Package Rework System. If any problems should occur during setup or operation of your system, call or contact Metcal's Technical Support Department at (714) 799-9910, Fax (714) 799-9533 or You may also contact your local Representative.

APR-5000 Array Package Rework System provides both accurate component placement and specifically tailored reflow profiles (through OK International patented single component Micro Oven™) in one user friendly, single platform rework system.

The challenges of Array Package Rework, and the inability to easily inspect placement accuracy (with BGAs in particular), call for a solution that allows for simultaneous viewing of PC board pads and component pads or balls for accurate placement. The APR-5000 fills this need with quick, accurate placement through the use of an optical system employing dual image overlay technology. The image of the BGA solder balls is overlaid with that of the PC board pattern. The image is viewed on the computer monitor then the micrometers permit fine X, Y and theta adjustment at up to 27X magnification. Finally, the part is placed and the vacuum is released automatically.

After accurate component placement is achieved, the vacuum pickup tube is automatically retracted and the reflow nozzle is lowered into place. At this point, the component is subjected to a 5 zone, full convection reflow profile, specifically tailored to the requirements of that particular PCB, device and solder paste. Accurate duplication of original oven reflow parameters is achieved.

During the course of the reflow profile, source temperatures and time intervals can be modified “On the Fly”, eliminating the need to wait for the current profile to terminate before modifications can be made. Precise solder joint temperatures are measured and displayed on a real time graphical display, thus providing the necessary data to accurately and easily establish the optimum reflow profile for each particular application within minutes.

When operating this equipment, please exercise caution. If this unit is used in a manner, which it is not intended for, serious personal injury may occur. Please read this operators manual thoroughly prior to use.

II. SYSTEM FEATURES AND ACCESSORIES

APR-5000 SYSTEM INCLUDES:

1. APR-5000 Series Base Unit
2. Adjustable size board holder
3. APR-5000 Accessory Kit (APR-5AK)

ACCESSORY KIT INCLUDES:

VNZ-01	APR Vacuum pick up nozzle 1mm O/D
VNZ-03	APR Vacuum pick up nozzle 3mm O/D
VNZ-05	APR Vacuum pick up nozzle 5mm O/D
VNZ-08	APR Vacuum pick up nozzle 8mm O/D
VNZ-12	APR Vacuum pick up nozzle 12mm O/D
SOFT-APR-5000	APR-5000 Installation Software
FS-APR-2	PCB Finger Short (Pack 2)
21104	Thermocouple fine gauge
20534	Squeege Handle
20066	Optical Calibration Gun sight
AC-RP	Nozzle Removal Pad
20207	Kapton Tape
FSL-APR-2	PCB Spring Finger Long (Pack 2)
UBS-APR	Under Board Support APR-5000
20987	Adjustable "V" Block for CSP Components
APR-VA	USB External Video Adaptor
APR-VRT	Vacuum Nozzle Removal Tool
	Power Cord
	Video Cable
	Monitor Cable
	Flathead Screwdriver
	Phillips Screwdriver
	3 Specialty Hex Wrenches
	1 Standard Hex Wrench Set

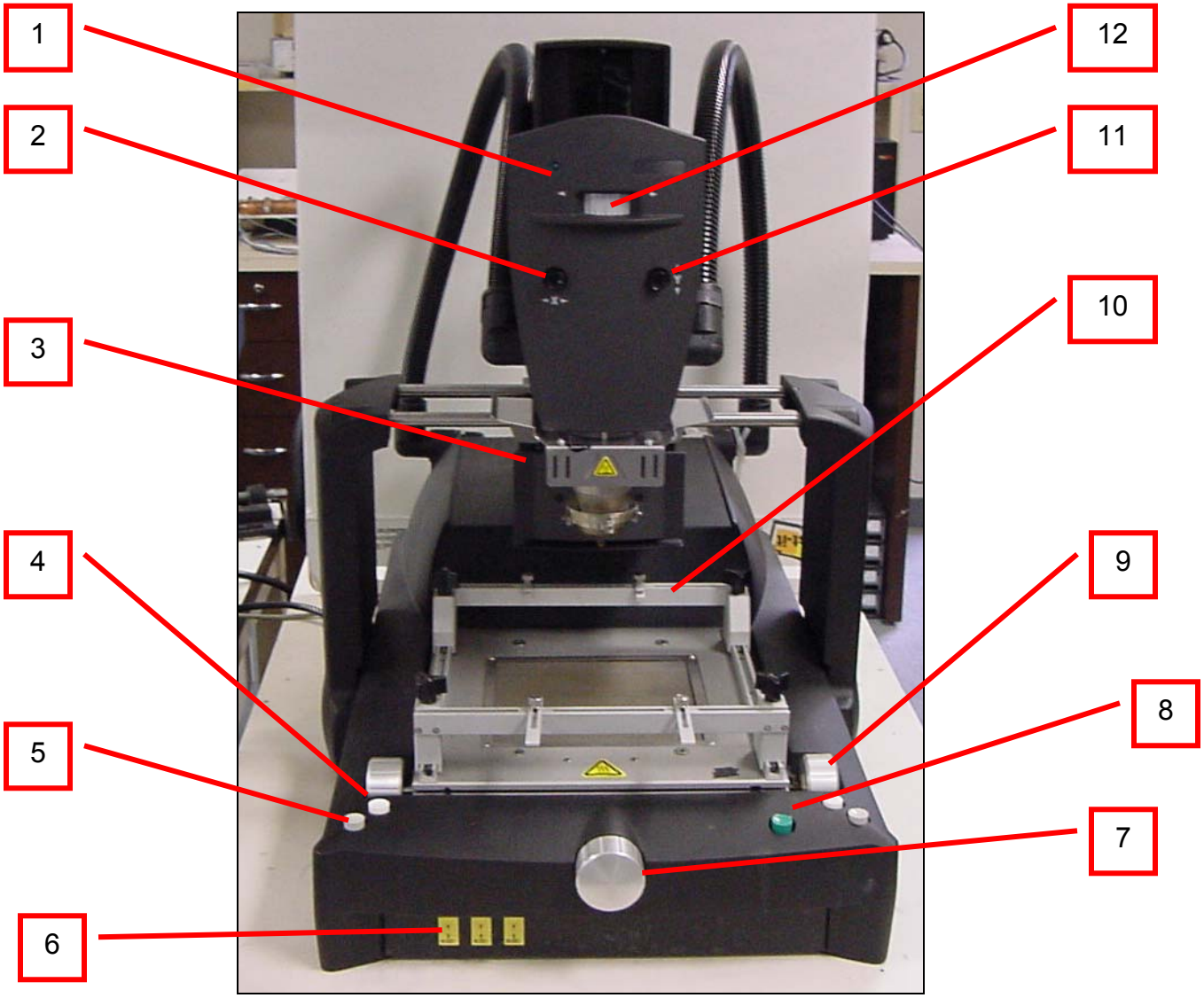


Figure 1

Main Unit Components (Figure 1)

1. Power “on” LED
2. Reflow head “X” axis release button
3. Camera & Lighting assembly
4. Reflow head “up” button
5. Reflow head “down” button
6. Type K thermocouple inputs (3)
7. “Y” Axis micrometer
8. Command "Enter" button
9. “X” Axis micrometer
10. Open Frame adjustable printed circuit board holder
11. Reflow head “Y” axis release button
12. Component theta control

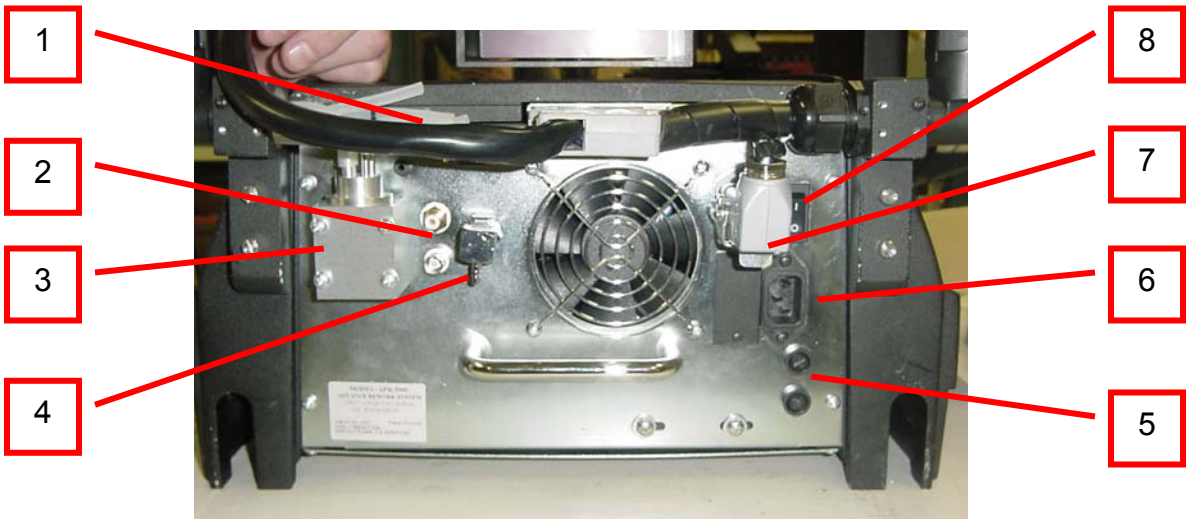


Figure 2:1 (Version 1)

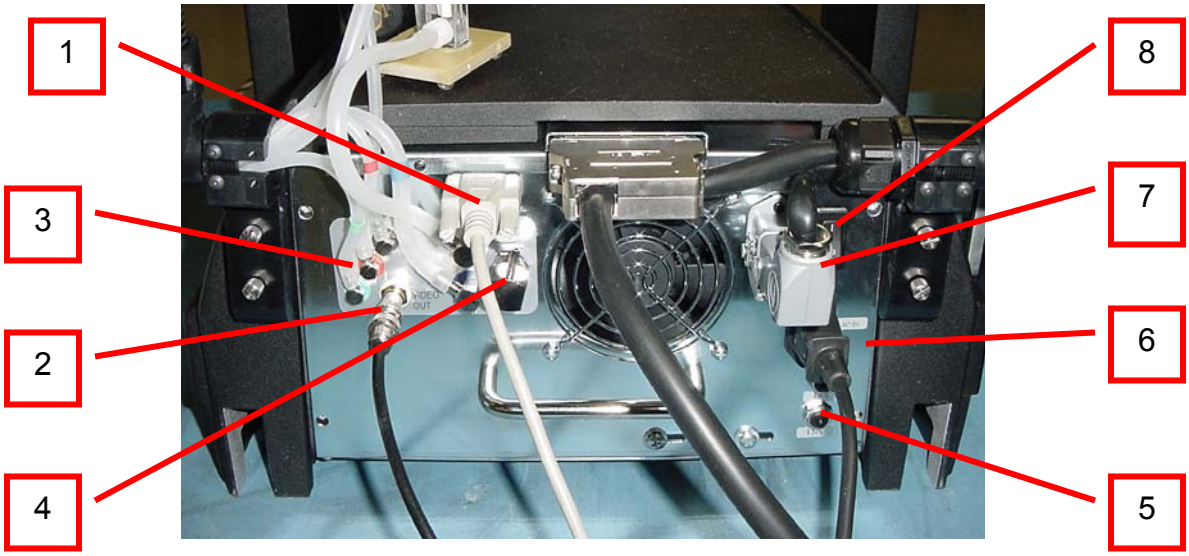


Figure 2:2 (Version 2)

Main Unit Components, Rear View (Figure 2.1 & 2.2)

1. RS-232 connector.
2. Composite video output.
3. Main air connector for reflow head.
4. Nitrogen / Shop air input connector.
5. Fuse Holder (Version 1) / Breaker (Version 2)
6. AC Power input.
7. Reflow head electrical connector
8. Main power switch.

CAUTION

The main unit is very heavy. Please uncrate it with 2 people.

DO NOT LIFT THE MAIN UNIT BY THE RAILS.
LIFTING BY THE RAILS WILL DAMAGE THEM!

III. SET-UP PROCEDURES

A. APR-5000 Main System

Prior to performing initial set-up, unpack all accessories from their shipping containers. Ensure that your APR-5000 has arrived complete by verifying that all of the accessories listed in Section II of this manual have been included. After all components are located, setup can then begin.

1. Remove the APR-5000 Main Unit and all accessories from their shipping containers.

When setting up this equipment, be sure to arrange it in a position that allows the user to operate this machine in a comfortable, well-spaced environment.

IMPORTANT: Every APR-5000 Rework System has been factory assembled and calibrated. Recalibration is not necessary after initial setup. However verifying calibration and product functionality is strongly recommended prior to initial use. This procedure is thoroughly discussed later in the manual in the section titled “Calibration.”

B. Computer and Software Setup

System Requirements

To run the APR-5000 you will need the following:

- PC with Pentium III processor (600 MHz or higher recommended)
- 128 MB of (RAM) memory
- 3.5” floppy disk drive
- Hard disk drive with at least 20 Megabytes of free space
- CD-ROM
- 32MB AGP video card or equivalent
- 17” Monitor (.28dpi)
- Windows® 98, 2000 or Windows® NT operating system (The APR-5000 is not Windows XP compatible)

Set-up

1. Unpack the computer and all its accessories.
2. Using the documentation supplied by the PC Manufacturer make all the necessary connections and power the computer “ON”.
3. Using the supplied disks, install the APR-5000 software.

The software will automatically start the “Installshield Wizard”.
Follow all the prompts and the software will self install.

4. Connect the PC to the APR-5000 utilizing the supplied RS-232 cable.
5. Connect the video output (Figure 2. #2) to the video input on the PC utilizing the supplied RCA video cable.

C. Final Power-up Sequence

1. Plug in the power cord on the APR-5000 Main Unit.
2. Set the APR-5000 Main power switch to the “on” position.
3. On the “desktop” Double click the icon.

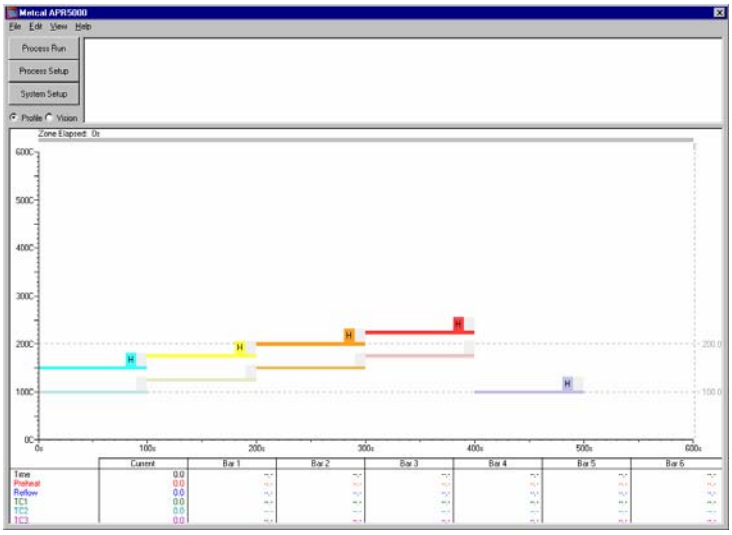
Your APR-5000 Series Rework System is now ready for operation!

IV. Software Operation

Once your system has been setup and your software has been installed you must follow this sequence for everyday operation of your APR-5000 system.

1. Set the APR-5000 Main power switch to the “on” position.
2. On the “desktop” Double click the icon. Allow system to initialize.

Your startup screen will appear as follows:



From this startup screen you have 3 options:

1. Process Run – This selection allows you to open and run a previously created and stored profile for either placement or removal.
2. Process Setup – This selection allows the modification of a previously stored profile or the creation of either a placement or removal profile.
3. System Setup – This selection allows you to set the system parameters, security levels and enter the calibration modes.

Process Run - Placement

1. Select Process Run from File Menu. Open the desired profile.
2. Attach vacuum cup.
3. Attach reflow nozzle. Click Next
4. Pull out camera to continue. Insert centering fixture. Click Next
5. Use action buttons to pick up the component. (Camera view pops up on the screen) Press action buttons to move head into focus. Click Next
6. Manually fine adjust component to vacuum tube, this brings the component into focus using the Up Down buttons on the screen. Align the component using the X Y and Theta axes adjusters. Click Next and return camera home
7. Display will now change to the profile view. “Hit action buttons to move the reflow head down into placement position.” Adjust component height using computer screen buttons. Click Next
8. Select Next to release the component onto its target pads.

9. “Hit action buttons to lower reflow head to set nozzle height.” Fine adjust nozzle height using computer screen buttons or APR-5000 manual keys.. Click Next
10. Select Next and then click Start to begin the profile.
11. When profile is completed. Click Next
12. “Hit action buttons to move head to home position.”
13. Save Saves graphics as a .DAT file.
14. Click “Finish” to complete process.

Process Set Up – New Process- *Placement*

1. Click on “process set up”
2. Click on “Placement only”
3. Click on “new process” and enter chip package information.
4. “Attach Vacuum Cup” and Reflow Nozzle.

1. Yes – Enter the vacuum cup part number.
2. No

   Click Next

   Attach Reflow Nozzle during process?
   - Yes – Enter the Nozzle part number.
   - No

     Click Next

5. Camera – Pull out camera to continue.

   Click Next
6. Select Component Pick-up Method.

   Click Next
7. Component – Set the height and the method for picking up the component.

- Component Pick Up – This mode picks up the part for a placement onto a previously prepared board.
- Component Pick Up with Paste – This mode picks up a component that has been stenciled with solder paste for placement onto the PCB.
- Component Pick Up with Flux Dip – This mode picks up of a component and allows the additional steps required to dip the part into a dip transfer plate.

  Click Next

8. Screen Prompt “hit action buttons to return head to home position.”

   Click Next
9. Screen Prompt “remove the centering fixture from the camera housing” Select Next to continue.

Click Next

10. Vision – Adjust camera parameters; lamp intensity, focus, zoom and iris controls.

    Click Next

11. Camera – Return camera to home position to continue.

12. Component – Set the height for placing the component.

- Coarse – action buttons
- Fine – Up / Down software buttons on screen or the action buttons

Move head down to place position.
Click Next

Adjust the nozzle height.
Click Next

13. "Create Profile" – This screen allows the setup of the air flow and heating parameters of the reflow cycle.

- Select the airflow rate: High, Med, Low/.
- Grab and move the temperature and time bars to the desired positions to create the thermal characteristics of the profile.

Click Start to run profile or Next to continue without running the profile.

- The display will prompt you to "Hit action buttons to move reflow head to the home position" the head will move at high speed to the top position. A window automatically opens to allow for the profile to be saved.

14. Save – This allows you to run the new process in verify mode, permitting you to change the settings while it runs and then save the profile. Or you can just save the process.

Process setup – New Process – Removal

1. Process Info
2. Software prompts "Select Yes" to attach vacuum cup and reflow nozzle during process Run and creates a custom user's prompt.
3. "Pull out camera to continue"
4. Adjust camera settings; focus height, zoom, lamp intensity, and iris controls. Click Next
5. "Return camera home to continue."
6. Adjust the reflow nozzle height. "Using action buttons move nozzle into position on PCB." Click Next
7. Set method of lifting. Click Next

8. Retract Vacuum Tube
9. Raise head
10. Do not remove
11. Select airflow rate and make adjustments to the profile settings in the profile window. Click Next
12. L M H
13. ”Hit action buttons to move reflow head to the home position.” Click Next
14. Start To verify your new process.
15. When completed click Next. Software prompts select Next
16. Select Next to release component. Window opens to save profile

Please do not use your hand to catch the component.
Even after the cooling cycle the component can be extremely hot.

V. HARDWARE TROUBLE SHOOTING & CALIBRATION

The following trouble shoot guide details a step-by-step process software trouble-shooting guide that will help identify APR-5000 hardware faults. If needed, Optical Calibration and Head Calibration is also detailed. For more in-depth calibration procedures and required parts refer to the APR-5000 Calibration Kit, part number APR-CALKIT.

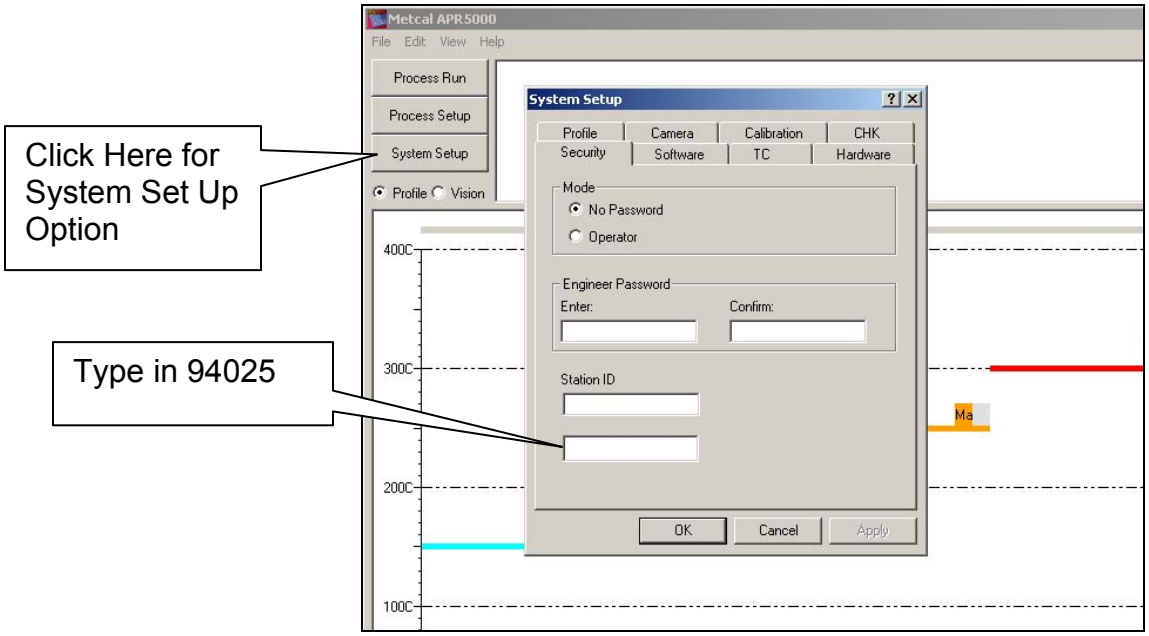
APR-5000 Hardware Trouble Shooting Guide

Set Up

1. Turn APR-5000 unit on and boot the APR-5000 Software.

2. Open System Set-Up by clicking System Set-Up.

3. Click on “No Password” button and enter the APR password 94025.



4. Click on the Test tab.

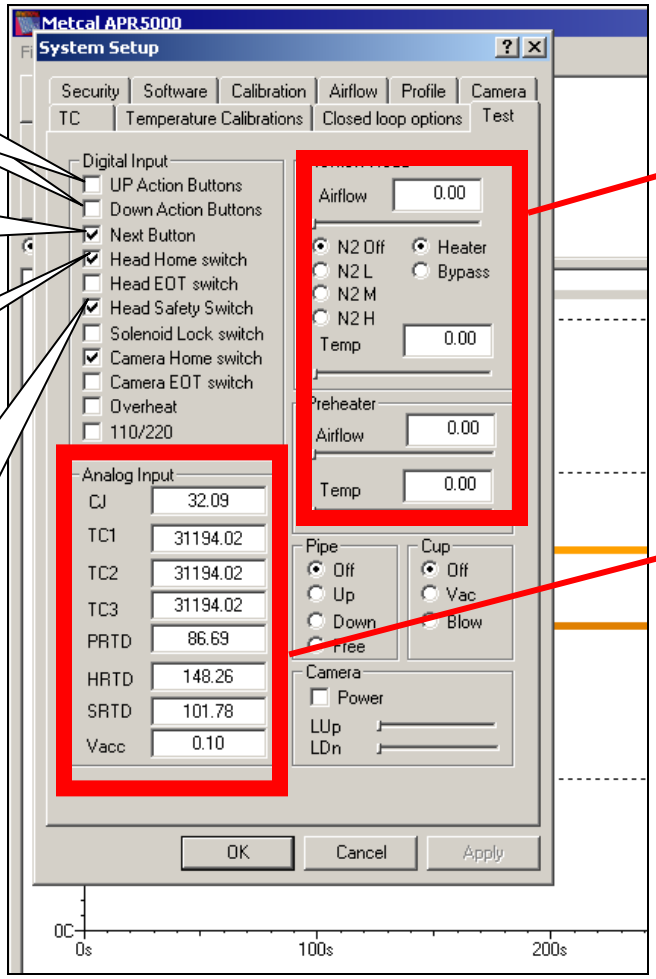
5. This test window must be exited as shown below to avoid any process run issues.

Press Action Buttons as noted. Check mark identifies if buttons are working properly.

Press Next Button as noted. Check mark identifies if button is working properly.

Head Home switch check mark must be checked.

Physically lift head up. Head Switch must go off when head is lifted.



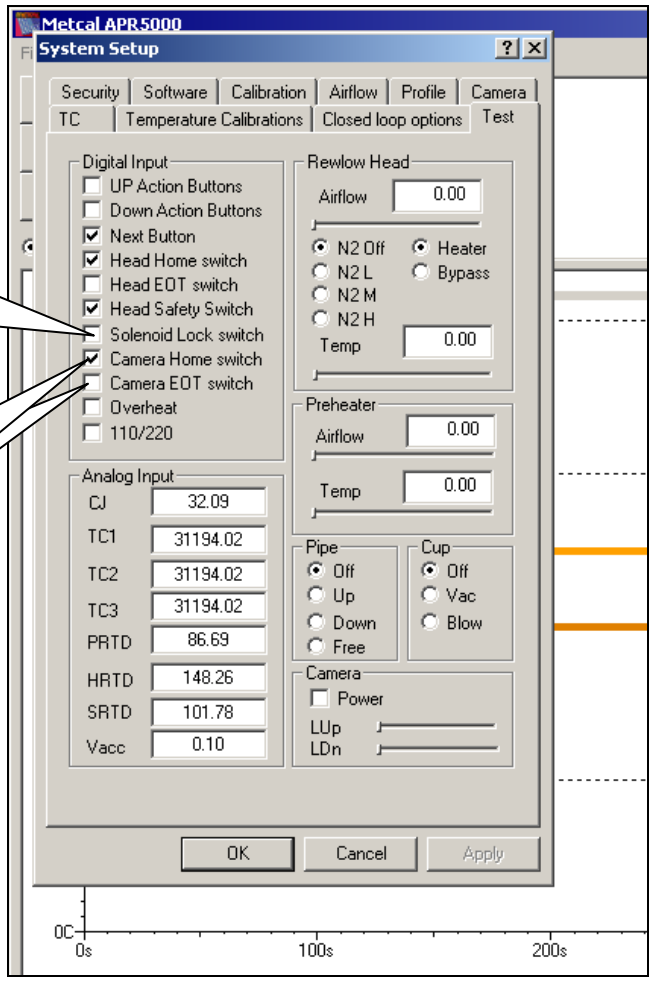
Inputs are not to be altered or tested.

Inputs are not to be altered or tested.

Notes

Physically press the head X and Y-axis switches on the APR-5000 heater head. Check mark must turn on momentarily.

Physically pull camera out. Check mark toggles from Camera Home switch to Camera EOT switch.



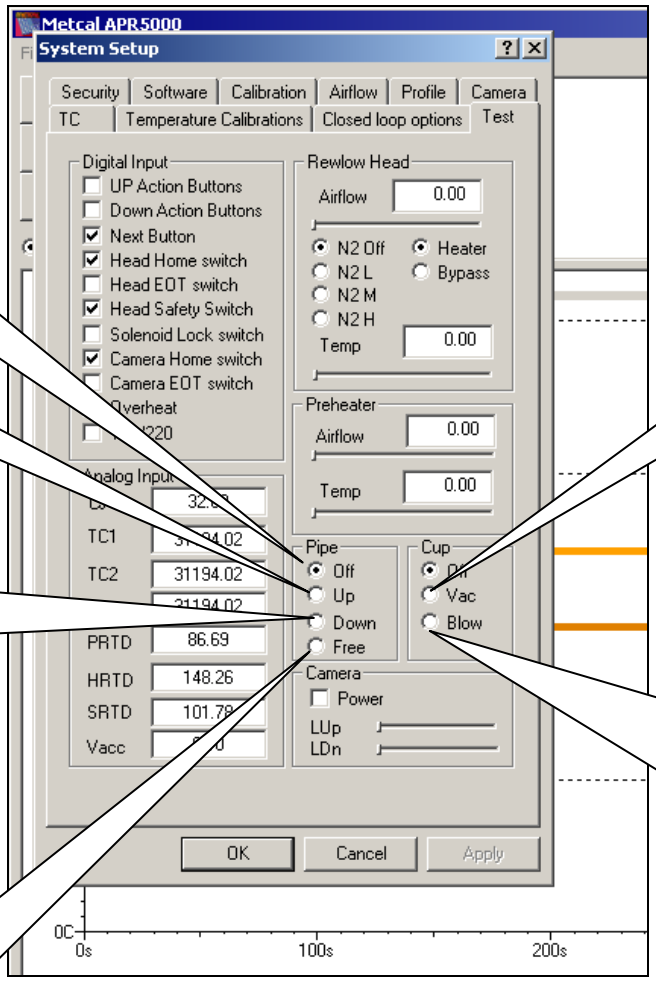
Notes

When “off” there is no air to the cylinder.

Click The vacuum tube will retract.

Click. When the button is depressed, the vacuum tube is extended and locked.

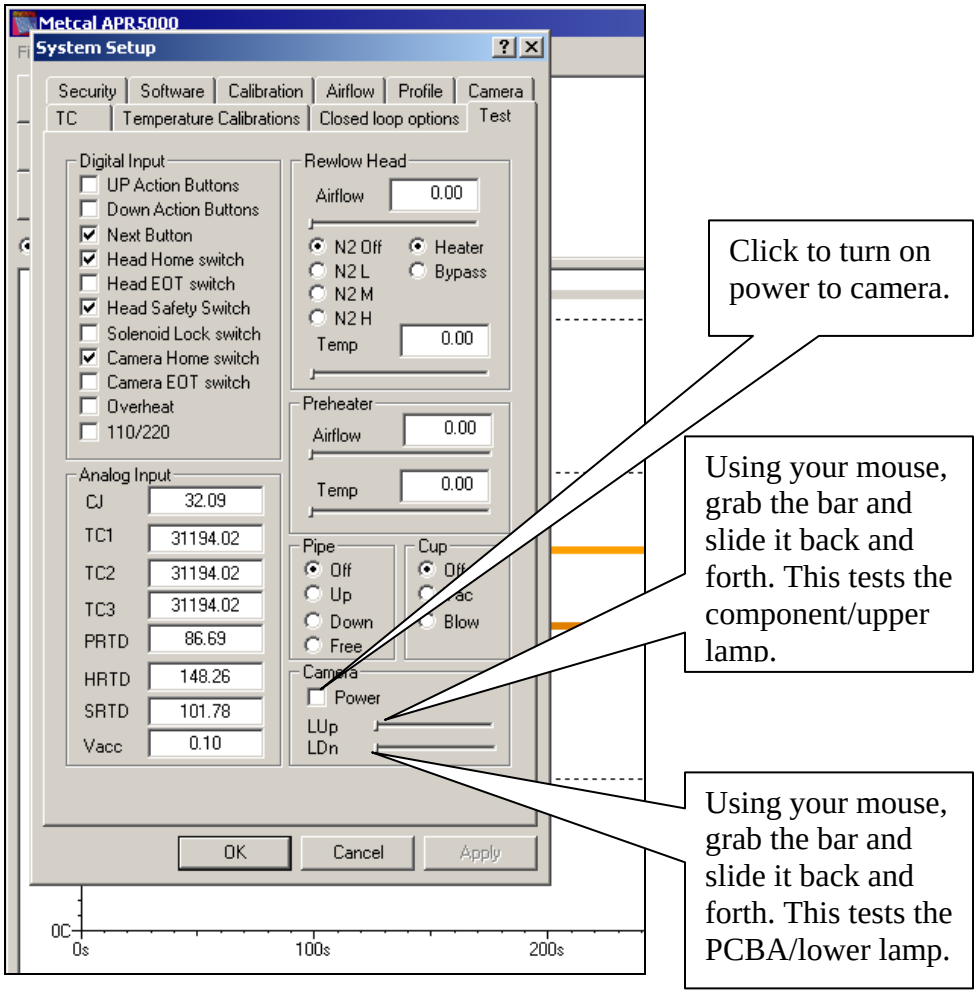
Click this button to check the pipette’s component pick-up capability. When depressed, the vacuum tube will be free-floating.



Click this button to check for vacuum pressure at the pipette. If the vacuum pressure is low or cannot lift a component, check the vacuum hoses and vacuum pump.

Click this button to check for component release air pressure. This has no minimum or maximum specification but must be able to release a component instantly from the vacuum pipette.

Notes



Before exiting the troubleshooting window you must ensure all check marks are in their original position. Failure to do so will hinder the performance of your APR-5000 and may cause a Process Run failure.

Notes

APR Camera to Head Alignment Procedure

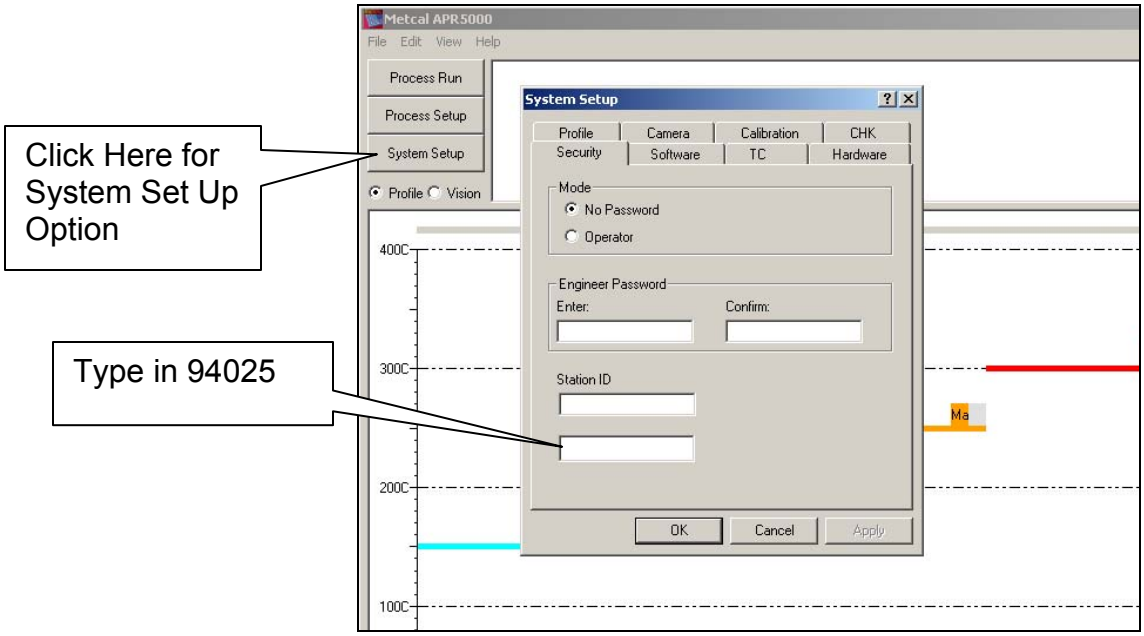
Tools Required

Large Vacuum
Gun Sight Tool
Calibration Mirror
Allen Keys

Procedure

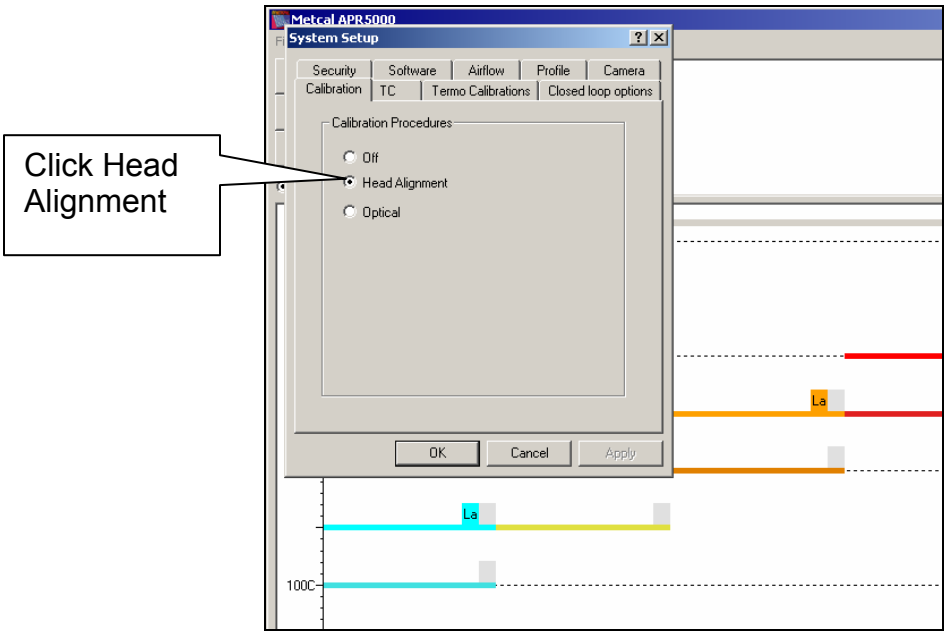
1. Turn APR-5000 unit on and boot the APR-5000 Software.

2 Open System Set-Up by clicking System Set-Up.

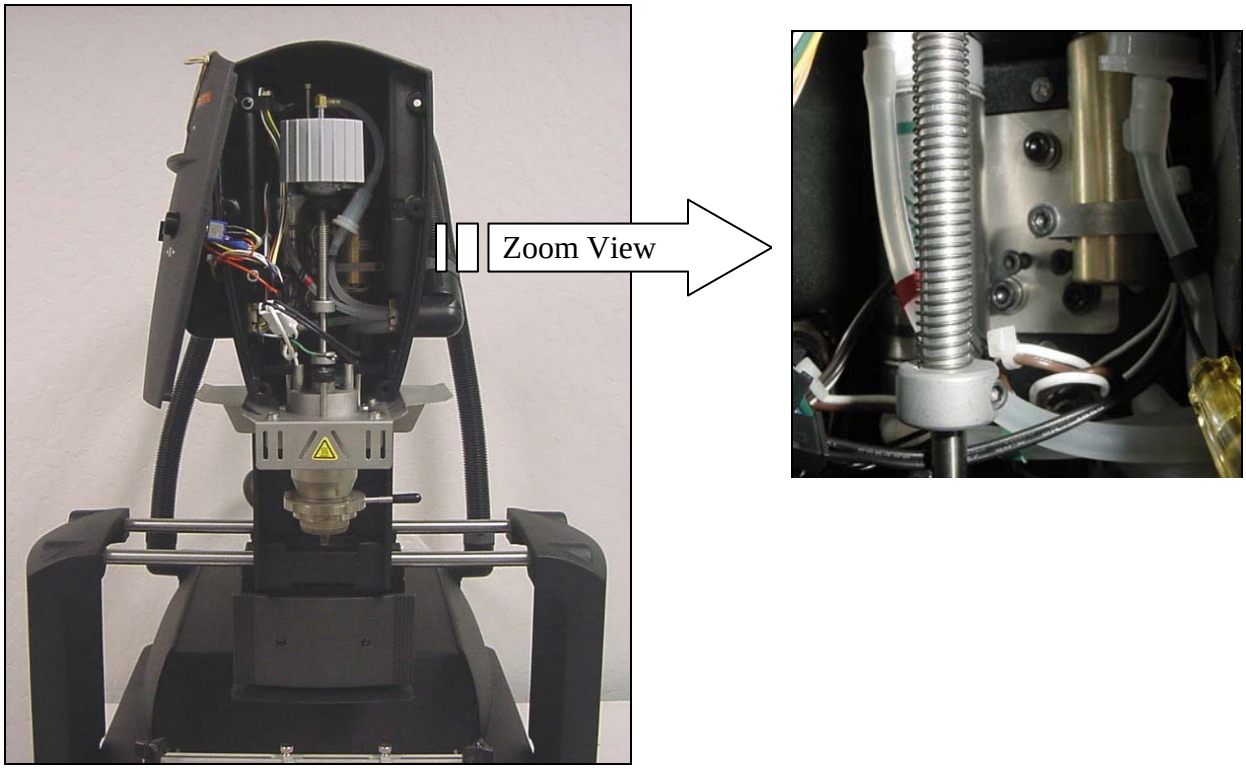


3. Click on “No Password” button and enter the APR password 94025.

6. Open Calibration Screen and Click on Calibration to set reflow to table co planarity. (See next page). The APR head will be in the “home”/up position.

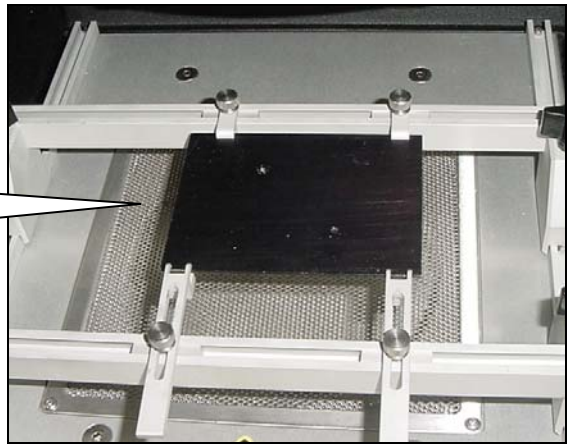


7. Carefully remove the front cover of the reflow head and hold into place using a using a tie-wrap or equivalent. Note the location of the side-to-side and to-fro adjustment screws on the left side of the vacuum tube. Do not loosen yet.



8. Reverse-mount the Gun Sight Tool onto the board holder.

Reverse-mounted Gun Sight Tool

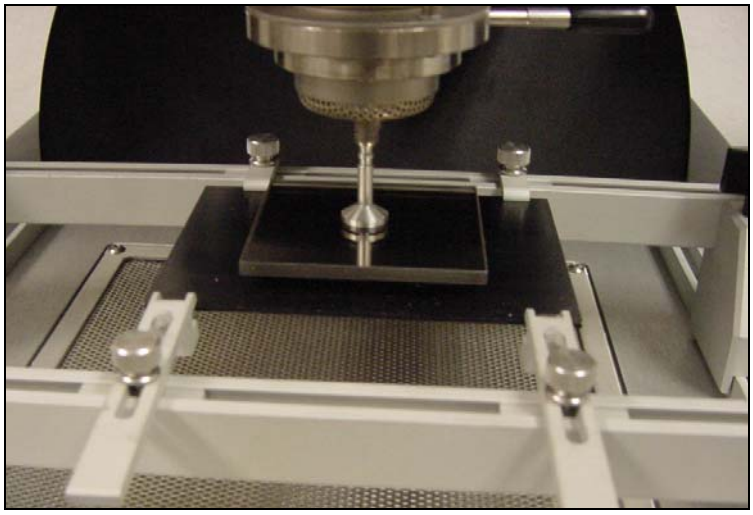


9. Take vacuum pipette #12, remove rubber o-ring, and attach the vacuum pipette to the APR.

Removing the o-ring allows you to optimize the vacuum pick-up point accuracy.

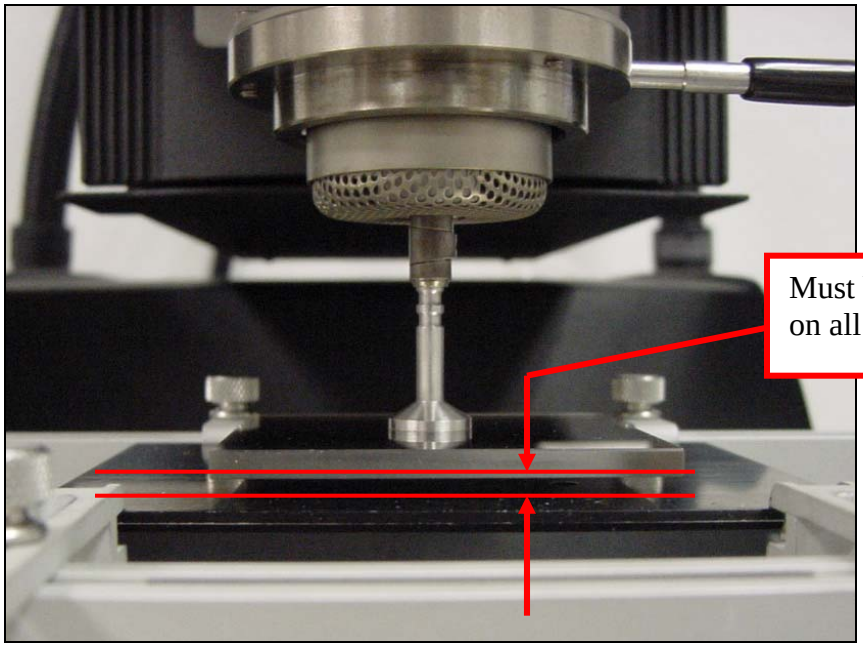
10. Follow prompts past the vision calibration to when the vacuum engages.

11. Next, mount the Calibration Mirror on vacuum pipette and, using the down action keys, lower the Calibration mirror approximately .25” over the reverse-mounted Gun Sight Tool.

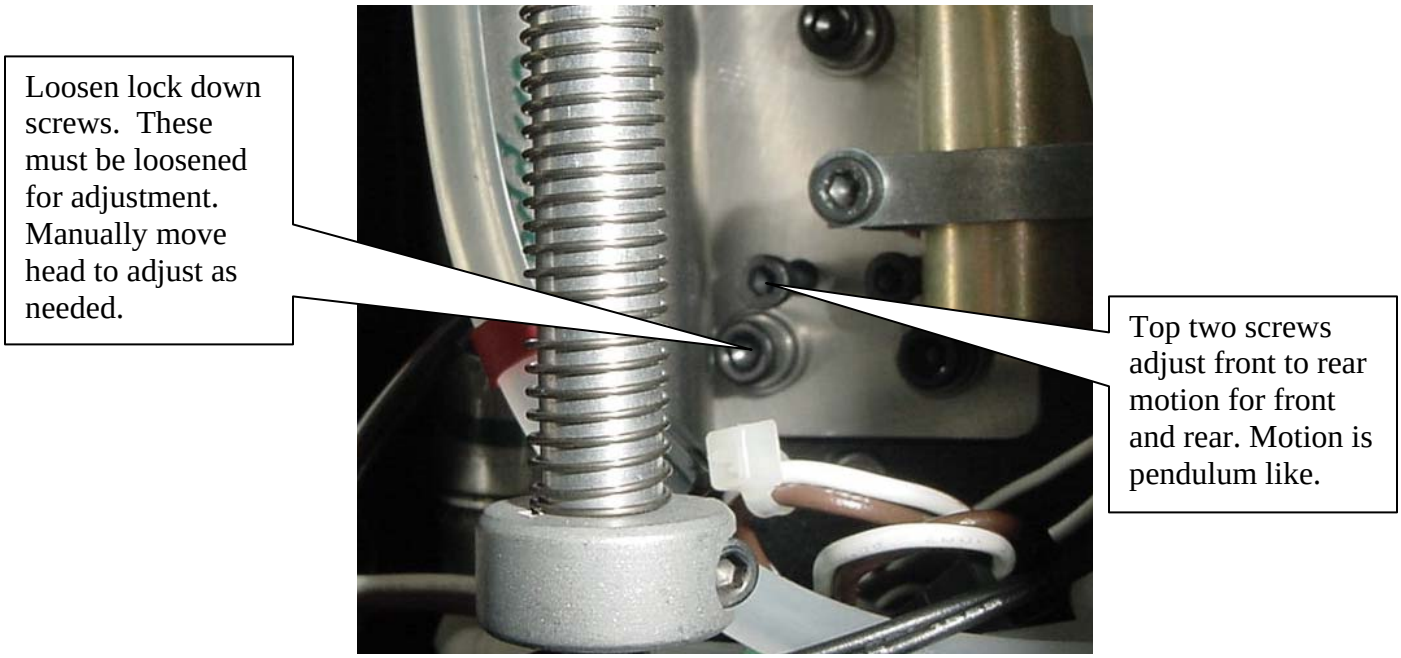


12. Using your software options, reduce the lowering speed to .001”

13. Using the down action keys, lower the mirror until the mirror nearly touches the reverse-mount the Gun Sight Tool and check distance to be parallel on all four edges.



14. If the calibration mirror is not parallel to the reverse-mounted the gun sight tool, loosen the adjustment screws as necessary and adjust the head manually until the mirror is parallel to the reverse mounted calibration tool.


Loosen lock down screws. These must be loosened for adjustment. Manually move head to adjust as needed.
Top two screws adjust front to rear motion for front and rear. Motion is pendulum like.

15. For a final test, lower the mirror to the reverse mounted gun-sight tool, release the mirror, and attempt to pick-up the component. If aligned correctly, the steel vacuum pipette will pick up the component. Adjust as needed.

16. When the calibration mirror is parallel to the reverse mounted gun sight tool, tighten the lock screws. Reassemble the front cover and proceed to the APR Head to Pick-Up Point Alignment Procedure Head.

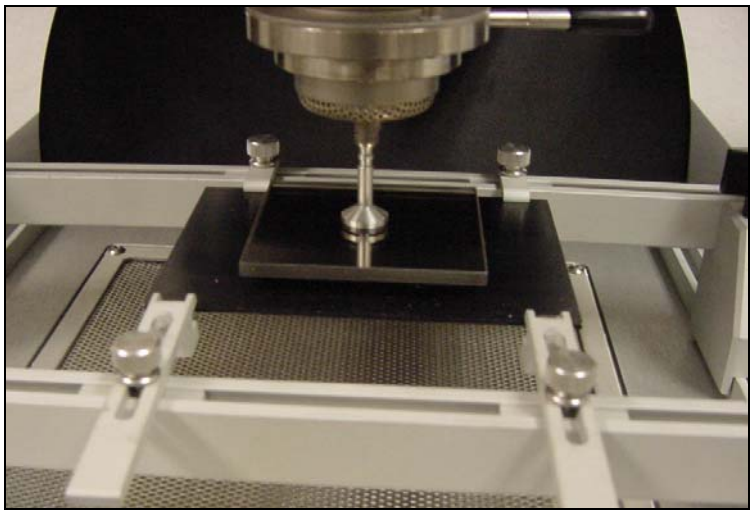
Notes

APR Head to Pick-Up Point Alignment Procedure

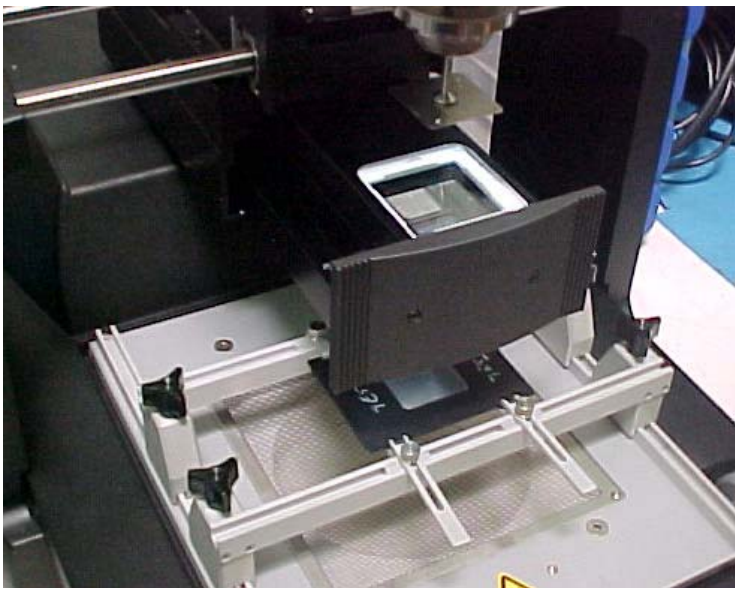
Tools Required

Large Vacuum
Gun Sight Tool
Calibration Mirror
Allen Keys

1. Drive the motor head down to the PCB pick up point and pick up the centered mirror.

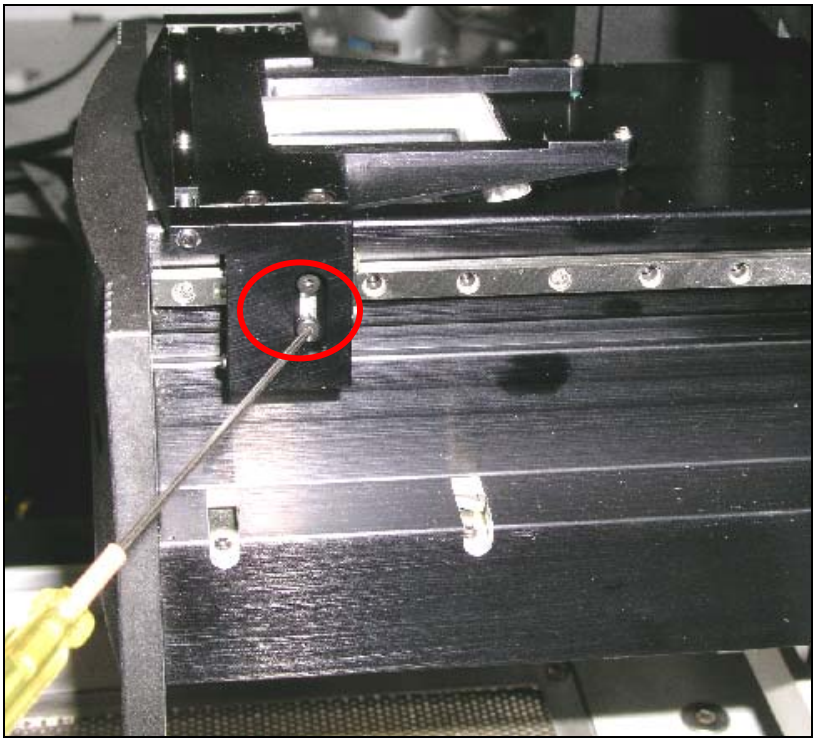


2. Drive motor up until the head is above the centering fixture. Pull out the camera.



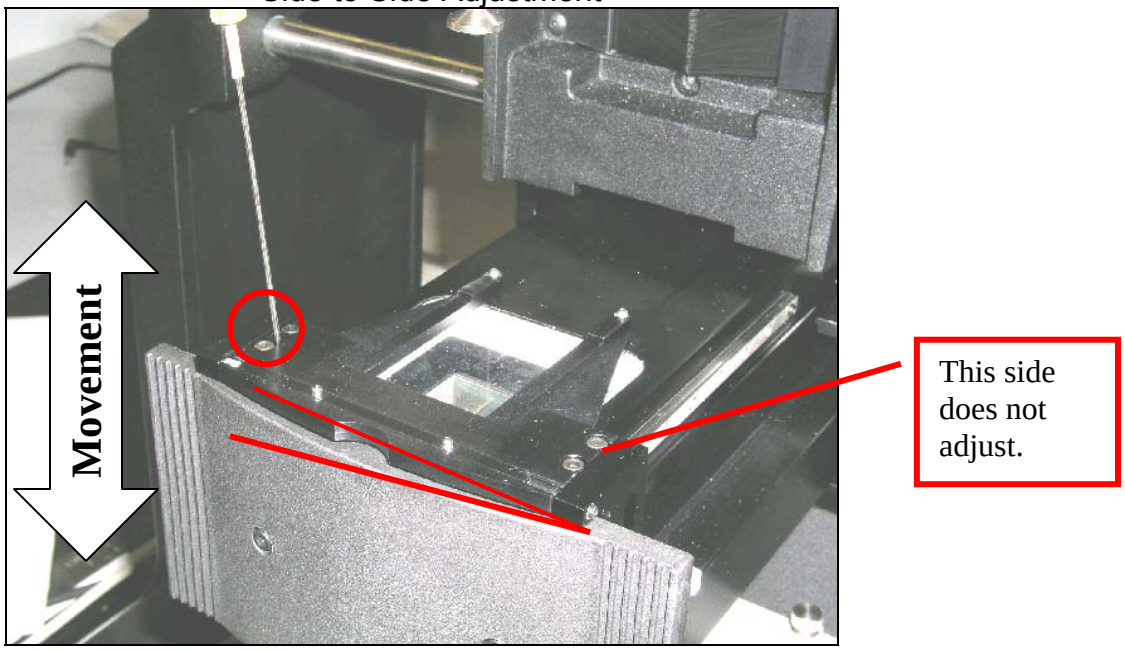
3. Pull out slide and loosen pick-up point lock-down screws. Lock Down Screws are located opposite each other on the camera for optimum adjustment.

Lock Down Screw

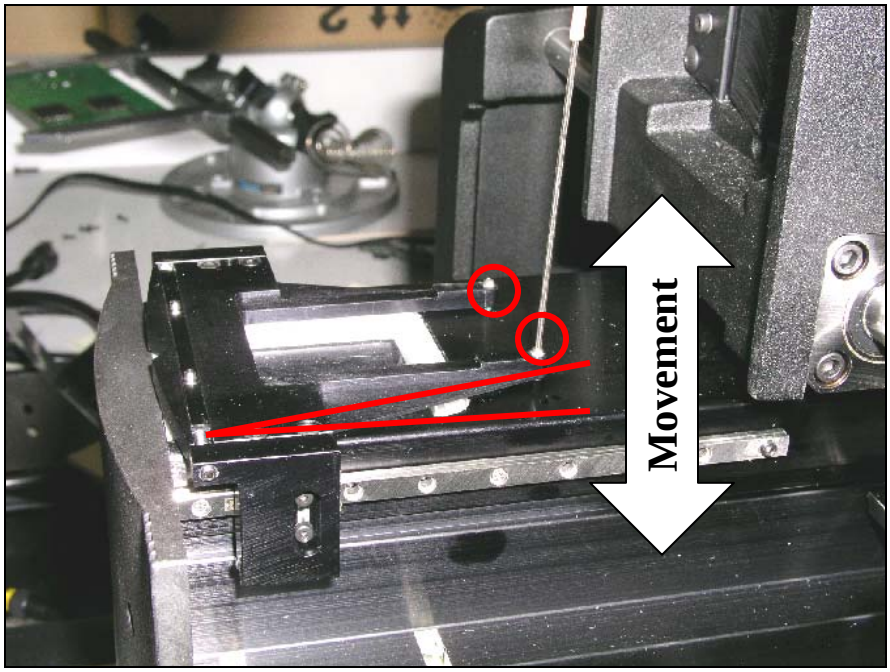


4. Adjust side to side as needed and front to rear as needed with mirror near the pick up point as a gauge.

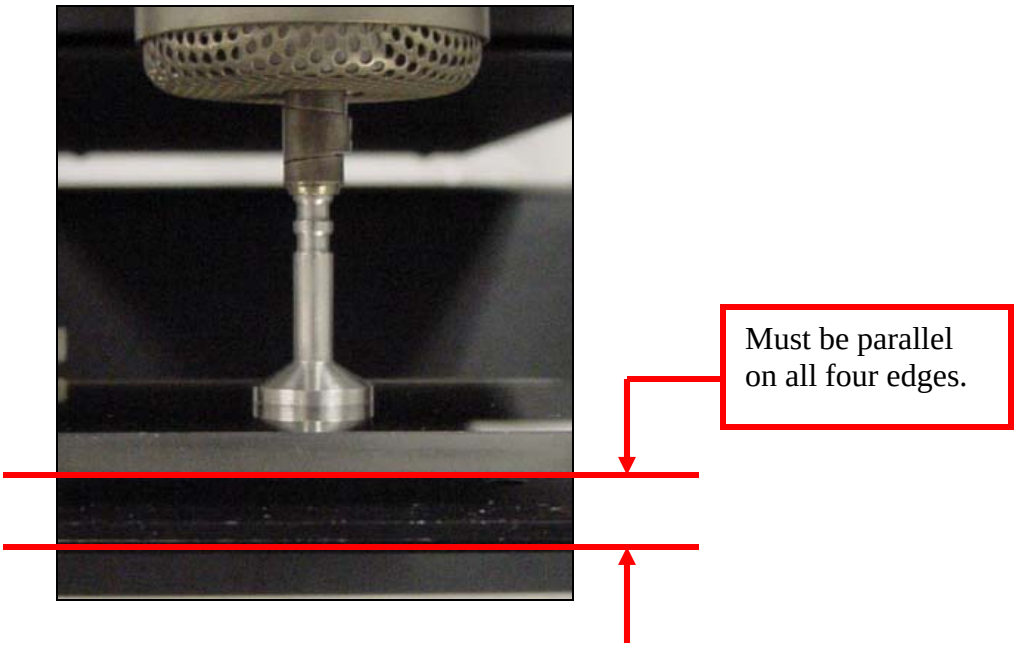
Side to Side Adjustment



Front to Rear Adjustment



5. Adjust until mirror is parallel to the pick up fixture. When parallel (see below), tighten the lock-down screws.



Notes

APR-5000 Optical Calibration Procedure

This procedure must be done after the Camera to head Alignment procedure has been finalized.

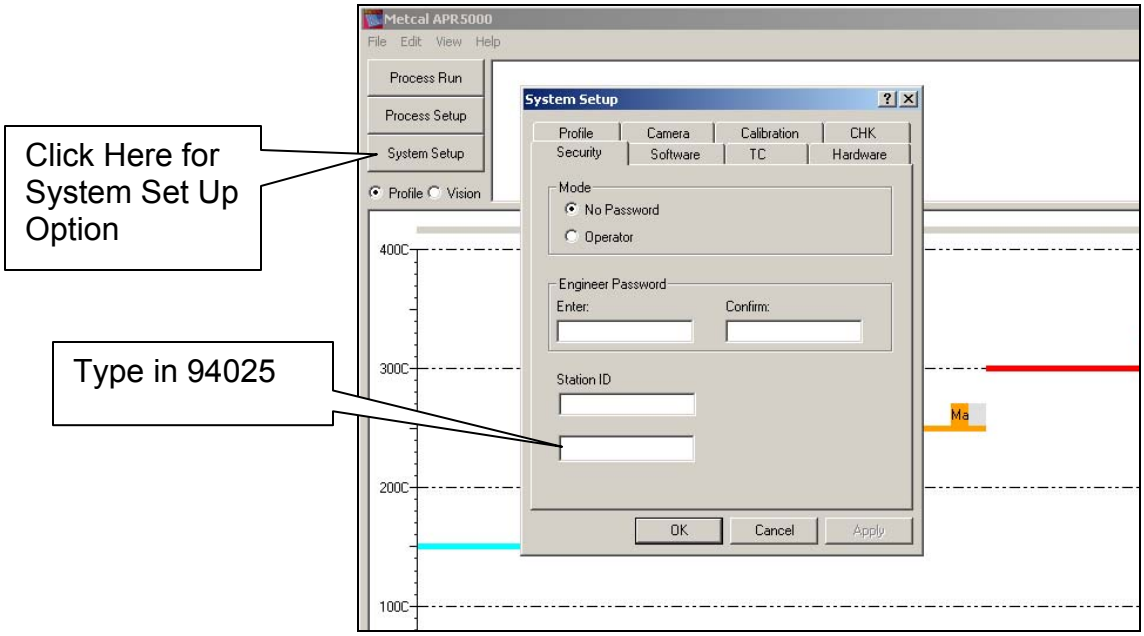
Tools Required

Large Vacuum
Gun Sight Tool
Allen Keys

Procedure

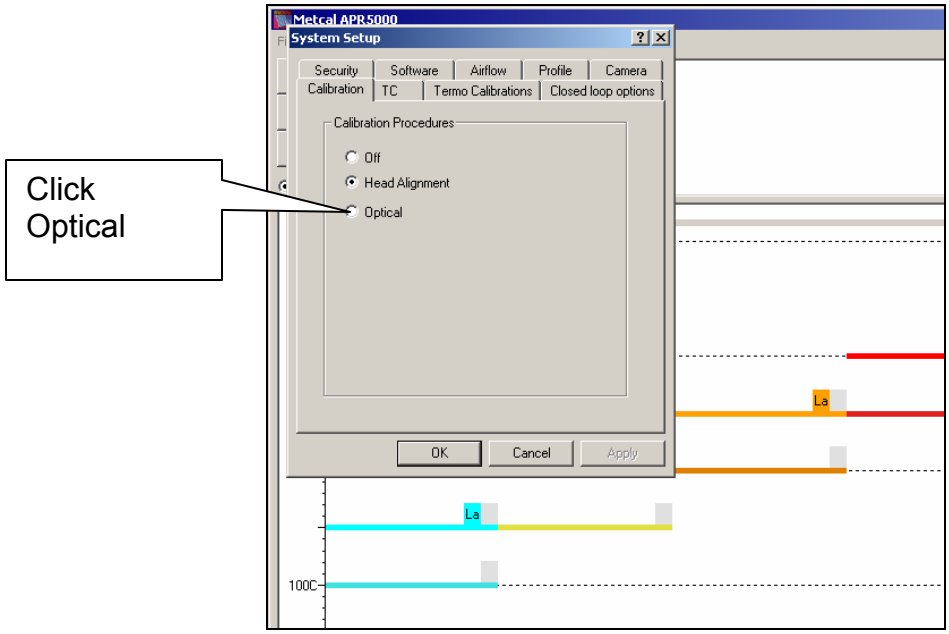
1. Turn APR-5000 unit on and boot the APR-5000 Software.

2 Open System Set-Up by clicking System Set-Up.

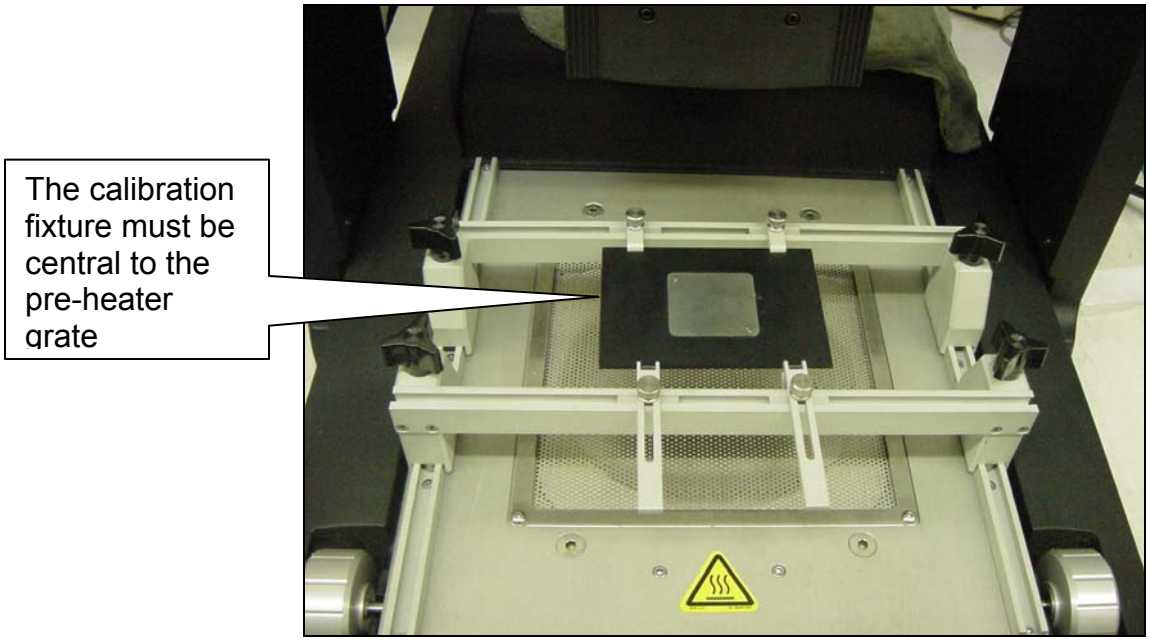


3. Click on “No Password” button and enter the APR password 94025.

4. Open Calibration Screen and Click on Calibration Tab and then, click the Optical option.



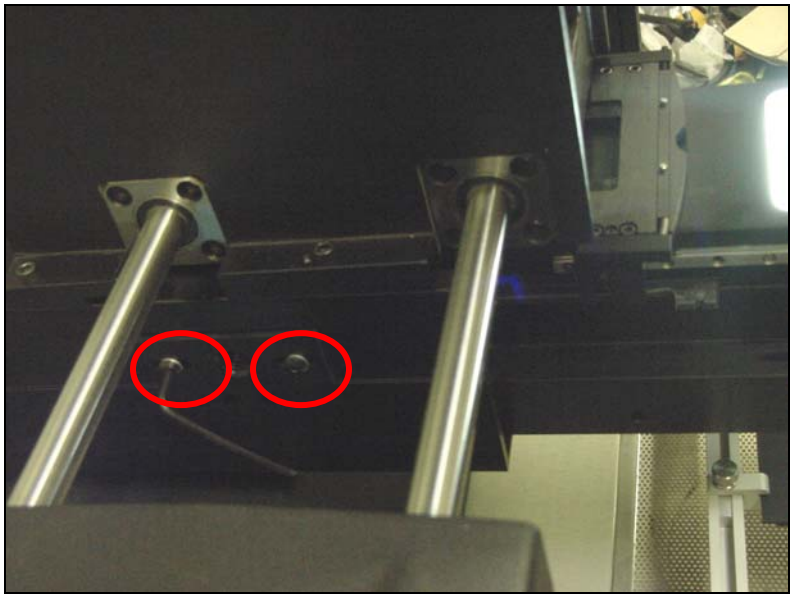
5. Place the gun-sight plate into position.



6. Follow prompts on screen to the Focus Vacuum Cup prompt. This approximately two steps into the software procedure.

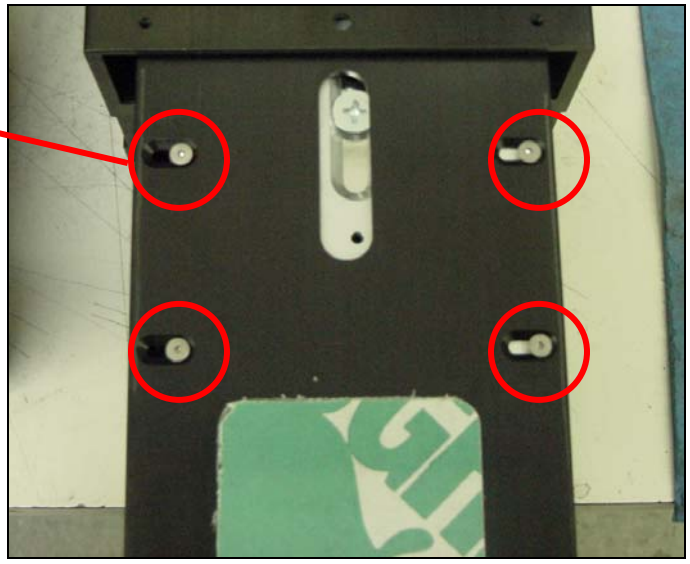
7. Press the down keys to focus the vacuum nozzle and using the head actions keys, align the image of the focused vacuum cup to the software window.

8. If the vacuum nozzle image is not centered in the Y-axis movement, adjustment the image using the Y-Adjustment screws using the appropriate Allen key.

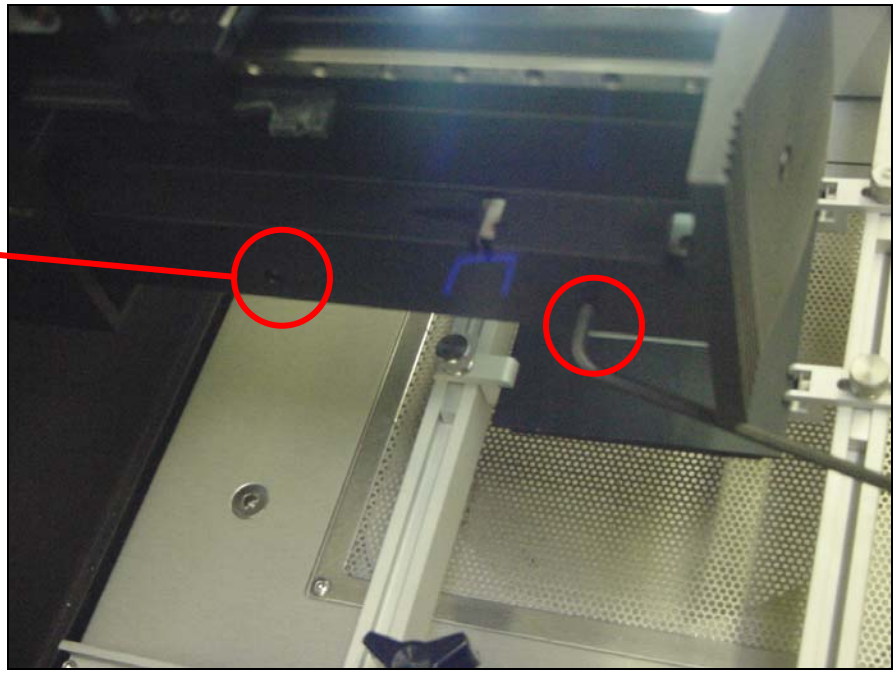


9. If the vacuum pipette image is not centered in the X movement, remove the camera shield and loosen the four-camera lock-down screws located underneath the front part of the camera.

Screws located underneath the camera.



10. When loosened, adjust the X-axis movement as needed to align the vacuum nozzle image to the center of the software image window.

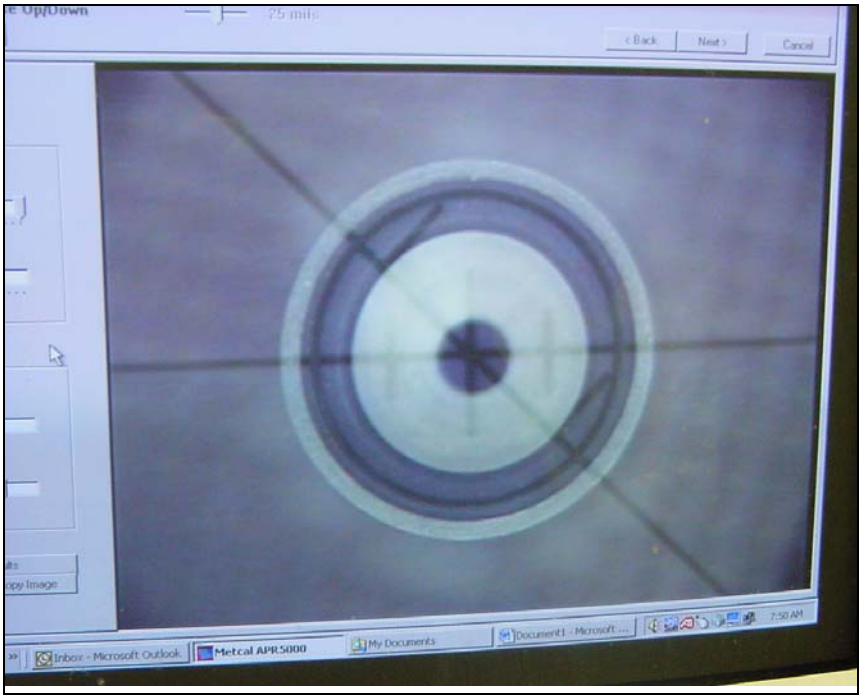


Note: When adjusting X-axis make to adjust booth screws per side equally.

11. Replace camera shield.

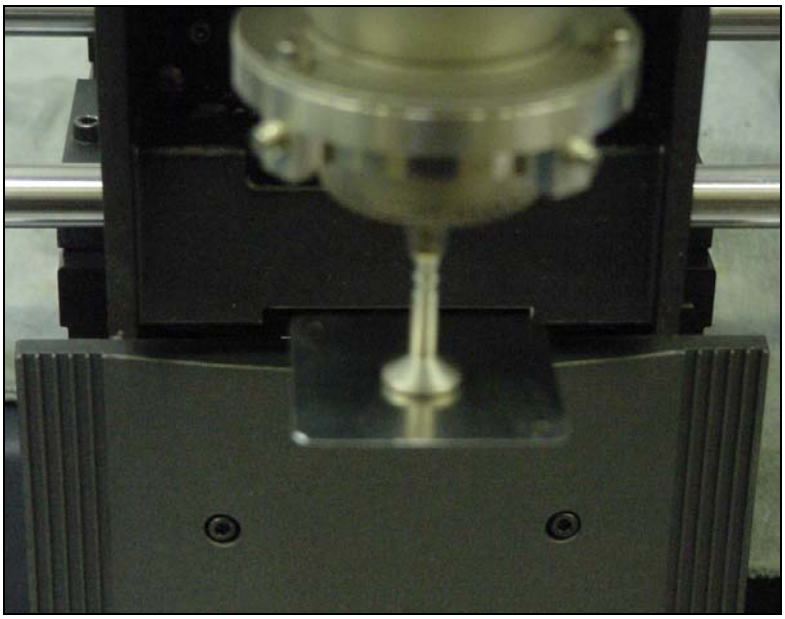
12. When the image is centered, tighten the camera lock-down screws located underneath the front part of the camera (screws identified in step 10 above).

13. The final image should have the vacuum cup centered in the software window. Now the vacuum head is central to the camera.

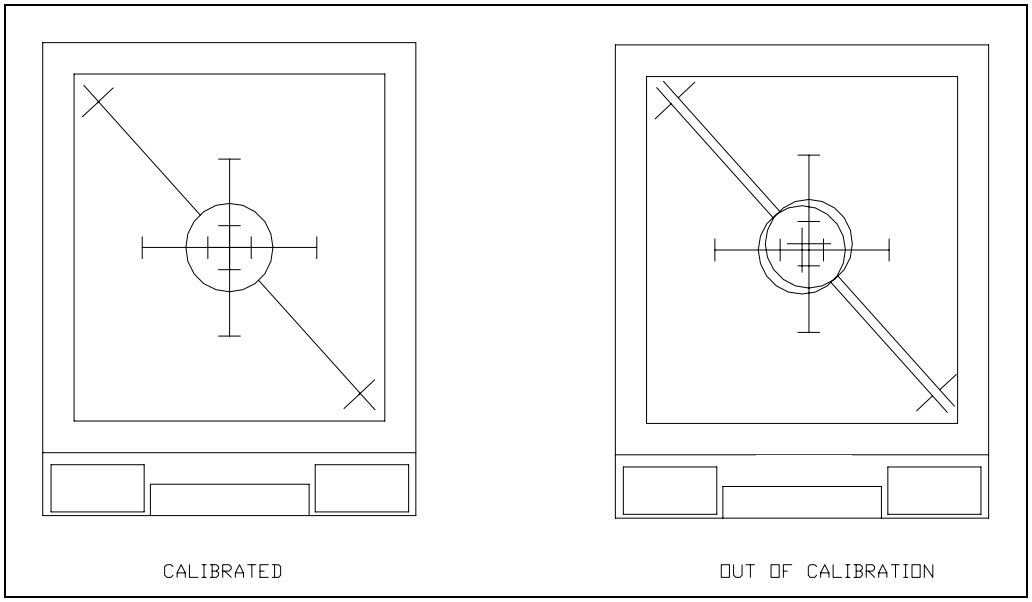


14. Click the “Next” key and follow the prompts on the monitor.

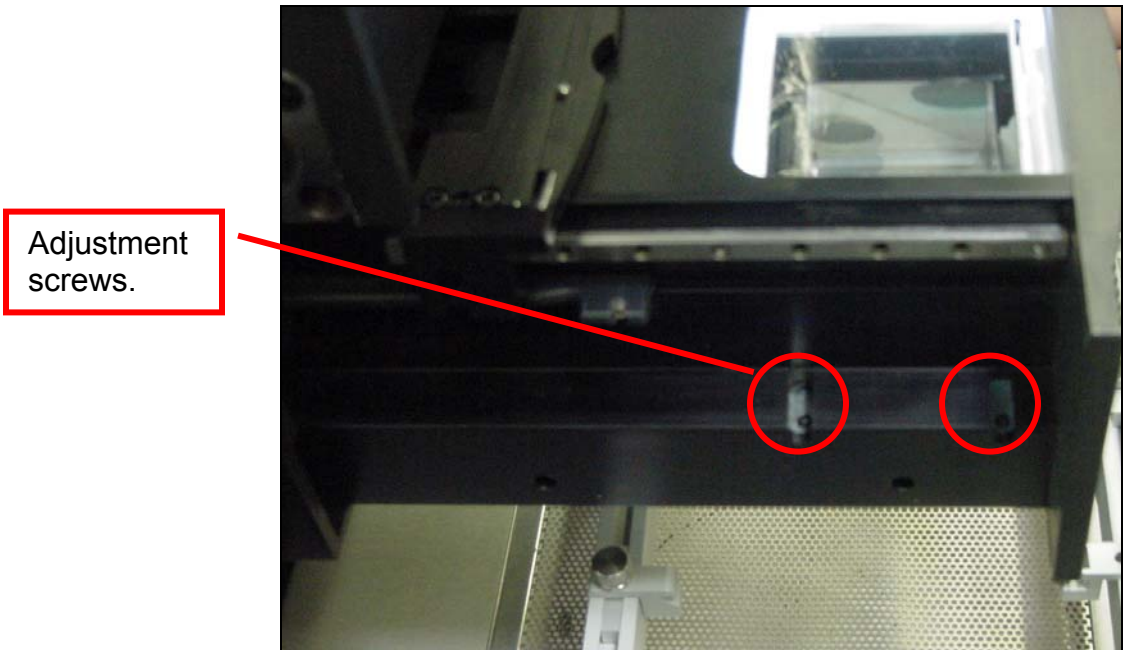
15. Pick up the component gun sight from the calibration fixture. The gun sight top plate must be picked up from the board holder. The pins on the gun sight keep both the top and bottom gun sights aligned prior to pick-up.



16. Using the Head Action Keys, align the focused vacuum cup image to the PCBA gun sight image and to the component gun sight. DO NOT adjust the micrometers.



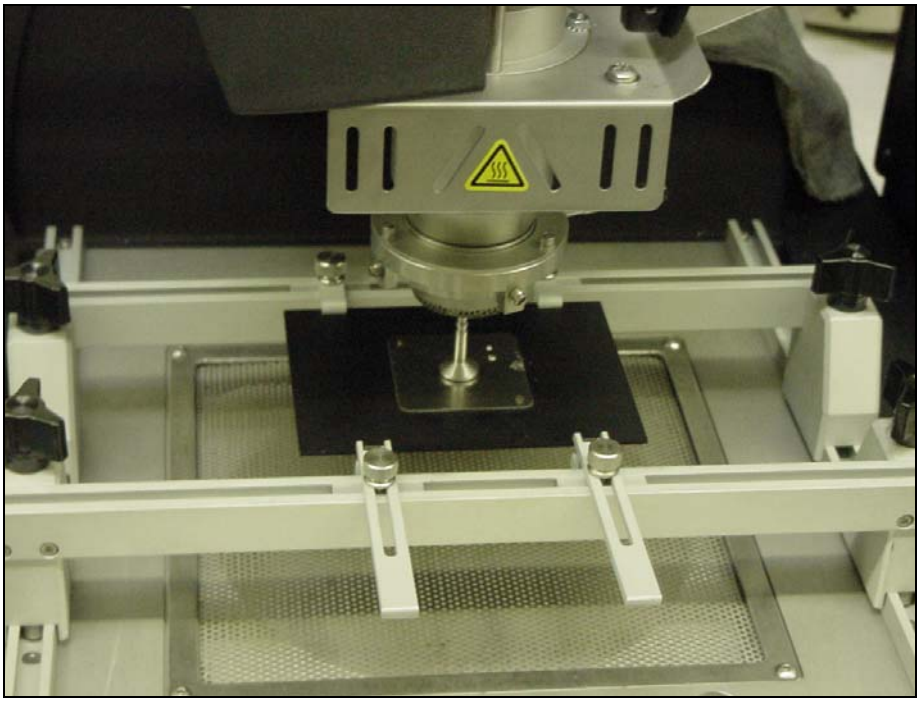
17. Adjust the gun sight adjustment screws located on the side of the camera until the component gun sight overlays the PCBA gun sight.



Note: The prism adjustment screws are adjusted as needed to overlay the top and bottom gun sight images. Each of the four screws can be adjusted as needed to achieve this.

18. Follow the directions on the screen.

19. To verify optical calibration, using the down action keys, lower the component gun sight to the PCBA gun sight.



Notes

VI. NOZZLES, VACUUM PICKUP NOZZLE AND ACCESORIES

Nozzles

NZA-060-060	APR Reflow Nozzle 6mm x 6mm
NZA-080-080	APR Reflow Nozzle 8mm x 8mm
NZA-080-095	APR Reflow Nozzle 8mm x 9.5mm
NZA-100-100	APR Reflow Nozzle 10mm x 10mm
NZA-130-130	APR Reflow Nozzle 13mm x 13mm
NZA-150-150	APR Reflow Nozzle 15mm x 15mm
NZA-180-180	APR Reflow Nozzle 18mm xm 18mm
NZA-200-200	APR Reflow Nozzle 20mm x 20mm
NZA-230-230	APR Reflow Nozzle 23mm x 23mm
NZA-250-290	APR Reflow Nozzle 25mm x 29mm
NZA-270-270	APR Reflow Nozzle 27mm x 27mm
NZA-300-300	APR Reflow Nozzle 30mm x 30mm
NZA-350-350	APR Reflow Nozzle 35mm x 35mm
NZA-400-400	APR Reflow Nozzle 40mm x 40mm
NZA-450-450	APR Reflow Nozzle 45mm x 45mm
NZA-490-490	APR Reflow Nozzle 49mm x 49mm

Vacuum Pick-Up Nozzle

VNZ-01	APR Vacuum pick up nozzle 1mm O/D
VNZ-03	APR Vacuum pick up nozzle 3mm O/D
VNZ-05	APR Vacuum pick up nozzle 5mm O/D
VNZ-08	APR Vacuum pick up nozzle 8mm O/D
VNZ-12	APR Vacuum pick up nozzle 12mm O/D
VNZ-19	APR Vacuum pick up nozzle 19mm O/D

Accessories

AC-RP	Nozzle Removal Pad
APR-NK	APR 5000 Nozzle Kit
APR-NK-CSP	APR 5000 CSP and Micro SMD Nozzle Kit
APR-VRT	Vacuum Nozzle Removal Tool
APR-COMP	Computer with 16" CRT Monitor
APR-COMP-F	Computer with 17" Flat Screen Monitor
APR-DK1	Demonstration PCB with BGA & CSP Component Kit
APR-FM	APR 5000 Flat Monitor
FL-APR-2	PCB Finger Long (Pack 2)
FLL-APR-2	Thick PCB Finger Long (Pack 2)
FLS-APR-2	Thick PCB Finger Short (Pack 2)
FLSL-APR-2	Thick PCB Spring Finger Long (Pack 2)
FLSS-APR-2	Thick PCB Spring Finger Short (Pack 2)
FS-APR-2	PCB Finger Short (Pack 2)
FSL-APR-2	PCB Spring Finger Long (Pack 2)
FSS-APR-2	PCB Spring Finger Short (Pack 2)
PF-1	KIT, Solder Paste/Flux Prep Plate
PICK-APR	Component Pick Up Plate
TF-1	Tape Feeder, Micro SMD

UBS-APR	Under Board Support APR-5000
VNZ-ORINGK	VNZ Pipette O-Ring Kit
APR-5AK	APR-5000 Accessory Kit
APR-VA	External Video Adaptor, USB

VII. CALIBRATION KIT & SPARE PARTS:

Listed below are the calibration kit and spare parts that are available for your APR-5000 Rework System.

Parts

APR-CALKIT	APR-5000 Calibration Kit
APR-AH	APR-5000 Air Hose Kit
APR-VF	APR Vacuum Filter
APR-HHA	APR-Heater Head Assembly
APR-HCA	APR-5000 Head Cover Assembly
APR-CL	APR Camera Lamp (Top & Bottom)
APR-CA	APR Camera Assembly
APR-PCGC	APR Protective Camera Glass Cover
APR-AS	APR Air Solenoid (for solenoid 1-4)
APR-VPC	APR Vacuum Pump/Compressor
APR-LCPCB	APR Logic Control PCB
APR-ACPCB	APR AC PCB
APR-MC	APR Motor Control
APR-PHK	APR-5000 Pre-Heater Kit, 115/220 VAC
APR-PHO	APR-5000 Pre-Heater O-rings
APR-PHB	APR-5000 Pre-Heater Blower
APR-HHP	APR-5000 Heater Head Pump
APR-ALRWH	APR-5000 Arm Lock Retractable Wire Harness
APR-ABK	APR-5000 Action Button Kit
APR-PHRTD	APR-5000 Pre-Heater RTD
APR-XAA	APR-5000 X-Axis Assembly
APR-VPUK	APR-5000 Vacuum Pick-Up Kit
APR-XALSK	APR-5000 X-Axis Lock Solenoid Kit
APR-CF	APR-5000 Cooling Fan
APR-YALSK	APR-5000 Y-Axis Lock Solenoid Kit
APR-THK	APR-5000 Table Hardware Kit
APR-YAK	APR-5000 Y-Axis Kit

VIII. SITE PREPARATION

Solder Removal:
Prepare the site to receive a new component by removing all of the residual solder. This can be accomplished by using an MX-500 Series Rework System with blade cartridge assembly. Employing OK International Smart Heat™ Technology into your rework process will virtually eliminate the potential of accidentally removing any pads when removing residual solder. This is because OK International patented Smart Heat™ technology ensures that tip temperature is constantly maintained, regardless of the

thermal demand of the assembly that is being reworked. For more information on OK International Smart Heat™ Technology, please contact your local Metcal representative or visit www.okinternational.com for more information.

The following blade style tips are available for the MX-500 Series Rework System:

SMTC-x60 (.410" length)
SMTC-x61 (.620" length)
SMTC-x62 (.870" length)
SMTC-x110 (1.55" length)

Please note that "x" denotes tip temperature. All cartridges are available in 500, 600 and 700 series styles. (5 = 500°F, 0=600°F and 1=700°F).

As an option you can utilize a vacuum desoldering system such as the SP-440 Self-Contained Desoldering System or MX-500DS Shop-Air Desolder / Solder Rework System to vacuum residual solder from the PCB.

NOTE ON CLEANING:
Although isopropyl rubbing alcohol and cotton swab work satisfactory for removing flux residue, it is strongly recommended you contact your solder paste manufacturer for recommendations for cleaning the residue left by their products.

SOLDER PASTE DEPOSITION and FLUX APPLICATION

Component Stenciling Templates

The application of new solder paste or flux directly to the component's solder balls can be accomplished with OK International Component Stenciling Templates. The templates allow the precise application of solder paste without concern for surrounding parts on your PCB. Since the component is pasted rather than the board, operators find this to be a much faster and simpler solution. Please contact your local representative for information and availability. Custom sizes and styles are available.

Solder Paste Application using the Component Stenciling Templates:

1. Select the correct solder paste plate for your component and application.
2. Position the component onto the component side of the plate (the side with the smaller cut out or etched component corners.)
3. Secure the component with the supplied clamp assembly. Please be careful not to over-tighten the clamp as this can cause the plate to bend which will affect print quality.
4. Apply solder paste to the solder balls using the supplied spatula. When printing, make sure the stencil face remains clean after your print, this ensures correct solder paste volume.
5. Carefully remove the component clamp assembly and position the solder paste plate onto the component pick up plate aligning it with the two tooling pins.
6. Using the vacuum pipette lift the component from the solder paste plate and continue with your alignment process.

Dip Transfer Plates
The application of high viscosity paste flux can be accomplished with OK International Dip Transfer Plates. These plates allow for a simple, controlled application of paste flux to the solder balls of your BGA or CSP component. They are available in many sizes and depths. Please contact your local representative for information and availability. Custom sizes and configurations are available.

Metcal has pioneered the application of high viscosity paste flux using specialized fixtures to ensure consistent repeatable results.

1. Select the Dip Transfer Plate that meets your components requirements for size and depth.
2. Using the supplied spatula fill the cavity with paste flux. Use the spatula to smooth the flux level with the sides of the transfer plate. This ensures a repeatable deposit.
3. Place your component into the component pick up plate and pick it up with the vacuum pipette.
4. Using the micrometers, align the component in the X, Y and Theta axes.
5. Remove the adjustable component fixture and replace it with the flux transfer plate.
6. Slide the prism into the placement arm, this unlocks the Z-axis arm and allows you to rotate the knob to dip the component into the flux. Slide the flux transfer plate towards the placement arm to the component pick-up position.
7. Follow the screen prompts to lower the component into the flux transfer plate so the solder balls contact the bottom plate of the flux transfer plate. Depress the “Z” axis “UP” buttons to return the component to the focus position.
8. Remove the component pick up plate and inspect the impression left in the flux to ensure all the solder balls have been coated.
9. Check component alignment and adjust as required.
10. Follow the screen prompts, push in the camera and click next.
11. Place the component as directed by the screen prompts, and continue with the placement process that you have selected.

IX. WARRANTY AND SERVICE

WARRANTY POLICY & SHIPPING PROCEDURES

The APR-5000 Array Package Rework System is under warranty for a period of 12 months from the purchase date for all parts and labor excluding misuse. Heating elements and lamps are under warranty for a period of 90 days.

5000	Array Package Rework Sys
APR-5000-C	Array Package Rework Sys w/PC
APR-5000-CF	Array Package Rework Sys w/PC & Flat Screen

TECHNICAL SUPPORT

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